

REMARKS

Prior to entry of this amendment, claims 1-39 are pending, but claims 34-39 are withdrawn from consideration. In this amendment, claims 2 and 35 are being canceled. Claims 1, 3, 5-9, 12-17, 21-34, and 36-39 are being amended. Thus, after entry of this amendment, claims 1, 3-34, and 36-39 will be pending. Reconsideration and continued examination of this application is respectfully requested in view of the amendments above and the remarks that follow.

Claim 1 has been amended to replace the term "flexible" with "polymeric" in connection with the multilayer reflector. Support can be found, for example, at page 8 line 26 to page 9 line 14 of the specification. Claim 1 has also been amended to replace "LED light" with "the excitation light" for more proper antecedent basis. No new matter has been added.

Claims 3 and 5-9 have been amended to delete the term "flexible" for consistency with claim 1. These claims also include other amendments for conciseness and improved readability. No new matter has been added.

Claim 12 is amended to depend from claim 1, and is reworded for improved readability and conciseness. Claim 13 is amended to delete the term "flexible" and for conciseness. No new matter has been added.

Claim 14 is amended to recite that the layer of phosphor material "comprises particles of phosphor material dispersed in a binder". Support can be found on p. 3 lines 12-13 and p. 14 lines 25-28. Note that such layer can be either continuous or discontinuous. For example, Applicants describe layer 22 of FIG. 2 (which is composed of one or more phosphor materials mixed with a binder) as a "substantially uniform phosphor layer". See e.g. FIGS. 2-3, and the present specification at page 3 lines 1-23 and page 9 line 15 to page 10 line 4. On the other hand, such a layer can also be discontinuous, as disclosed on page 19 lines 9-28 of the present specification. Claim 29 is amended in like fashion to claim 14. No new matter has been added.

Claim 15 is amended to depend from claim 14, and recites that the layer of phosphor material (which comprises both the phosphor particles and the binder) is "discontinuous" to form "distinct regions". Support can be found in the discussion on page 19 lines 9-28. Claim 30, which depends from claim 29, is amended in like fashion. No new matter has been added.

Claim 16 is amended to depend from claim 15, and for conciseness. The term “dot” is replaced with “region”. Claim 31, which depends from claim 30, is amended similarly. No new matter has been added.

Claim 17 is amended to replace “dot” with “region”, and reworded for clarity and for antecedent basis. Support can be found on page 19, lines 9-28. Claim 32, which depends from claim 30, is amended similarly. No new matter has been added.

Claims 21-28 are amended for conciseness and readability, and in some cases to eliminate the term “flexible”.

Claim 33 is amended to replace the term “dot” with “region”, and to change dependency to claim 30, and for conciseness. Support can be found in the discussion on page 19 lines 9-28. No new matter has been added.

Withdrawn method claim 34 is amended to replace “flexible” with “polymeric”, as was done in claim 1, and to correct grammar and add the article “the” for antecedent basis purposes. No new matter has been added.

Withdrawn method claim 36 is amended to delete the term “flexible” and other unnecessary verbiage. Withdrawn method claim 37 is amended to delete the term “flexible” and is reworded for conciseness and proper antecedent basis. Withdrawn method claim 38 is amended to depend from claim 34, and for conciseness and proper antecedent basis. Withdrawn method claim 39 is amended for conciseness and to eliminate unnecessary verbiage. No new matter has been added.

§ 102 Rejections

Claims 1, 4-6, and 14

These claims were rejected under 35 USC § 102(b) as anticipated by U.S. Patent 6,155,699 (Miller et al.).

In response, claim 1 has been amended to recite a “non-planar polymeric multilayer reflector”. Since Miller does not teach polymeric multilayer reflectors, the rejection of claim 1, and its dependent claims 4-6 and 14, cannot be sustained and should be withdrawn.

Claims 1, 4-7, and 14-17

These claims were rejected under 35 USC § 102(e) as anticipated by U.S. Patent 6,686,676 (McNulty et al.).

In response, claim 1 has been amended to recite a “non-planar polymeric multilayer reflector”. Since McNulty does not teach polymeric multilayer reflectors, the rejection of claim 1, and its dependent claims 4-7 and 14-17, cannot be sustained and should be withdrawn.

Moreover, the amendments to claims 14 and 15 make clear that the distinct “regions” of claims 15-17 each comprise phosphor particles dispersed in a binder. Such layer is not disclosed in McNulty. The rejection of claims 15-17 should thus be withdrawn for this additional reason.

§ 103 Rejections

Claims 1, 3, 12, and 13

Claims 2-3 and 12-13 were rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent 6,155,699 (Miller et al.) in view of U.S. Patent 5,831,375 (Benson, Jr.). According to the Office Action, “it would have been obvious ... to provide the light source of Miller with a non-planar flexible multilayer reflector comprising polymeric material, as taught by Benson, for reflecting light onto the phosphor material.” In view of the cancellation of claim 2 and the addition of the term “polymeric” in claim 1, Applicants interpret the rejection to apply to amended claims 1, 3, 12, and 13.

Applicants respectfully submit that the rejection cannot be sustained.

As an initial matter, both before and after the amendment, claim 1 recites that the non-planar multilayer reflector “reflects the excitation light and transmits visible light”. Neither Miller nor Benson Jr. teach this feature. In Miller, the wavelength selective reflector is a distributed Bragg reflector (DBR) mirror that operates to *transmit* “primary light” emitted by the LED die and *reflect* much of the converted “secondary light” emitted by the phosphor layer. See e.g. column 2 line 58 to column 3 line 33, or column 3 line 47 to column 4 line 9. This is opposite to the quoted feature from claim 1. Benson, Jr. relates to electroluminescent lamps that utilize electrical excitation rather than optical excitation, and thus there is no excitation light whatsoever for the disclosed multilayer optical films to reflect. Since neither reference teaches a multilayer reflector “that reflects the excitation light and transmits visible light”, as recited in claim 1, the rejection of claims 1, 3, 12, and 13 cannot be sustained and should be withdrawn.

Furthermore, as just mentioned, Miller and Benson, Jr. are directed to very different subject matter: Miller relates to LED-excited phosphor-based light sources (PLEDs), whereas Benson, Jr. relates to electroluminescent lamps. Unlike the PLEDs of Miller, Benson, Jr.'s electroluminescent lamps are not optically excited, and because of that they have no need for wavelength-selective reflectors. Furthermore, the electroluminescent lamps "are typically used for applications in which *flat or planar* light sources are useful." (Column 1 lines 18-20 of Benson, Jr., emphasis added.) Without the benefit of improper hindsight, the person of ordinary skill would not think to modify the flat, planar components of Benson, Jr. into wavelength selective complex-curved filters suitable for replacing Miller's DBR mirror, which is formed into a "dome-shaped shell" and preferably "generally hemispheric" (Miller at col. 5 lines 33-38), nor would such person have a reasonable expectation of success in such endeavor. For this additional reason, the rejection of claims 1, 3, 12, and 13 based on the combination of Miller and Benson, Jr. cannot be sustained and should be withdrawn.

Applicants also note that Benson, Jr. is non-analogous art. For purposes of evaluating the obviousness of claimed subject matter, each reference relied upon must constitute "analogous art". See MPEP§2141.01(a)(1). In this regard, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. See *Id.*

The Benson, Jr. reference is not in the field of applicants' endeavor. Benson, Jr. is directed to electroluminescent lamps. See col. 1, lines 10-20. Applicants' field of endeavor is phosphor-based light emitting diode (LED) light sources. Electroluminescent lamps and phosphor-based LED light sources are not the same field of endeavor. One of skill in the phosphor-based LED light source art would not consult the electroluminescent lamp art when trying to solve a phosphor-based LED light source problem. Thus, the Benson, Jr. reference is not in the field of applicants' endeavor.

Nor is the Benson, Jr. reference reasonably pertinent to the particular problem with which the inventors were concerned. The inventors were concerned with, among other things, improving the operation of phosphor-based LED light sources through efficient separation of LED excitation light and light emitted by the phosphor. Benson, Jr. is concerned with improving electroluminescent lamp efficiency by reducing losses in back reflectors and polarizers. See e.g.

the background and summary in columns 1 and 2 of Benson, Jr. One of ordinary skill in the phosphor-based LED art would not be reasonably expected or motivated to look to the electroluminescent arts for improving phosphor-based LEDs. For this additional reason, the rejection of claims 1, 3, 12, and 13 based on the combination of Miller and Benson, Jr. cannot be sustained and should be withdrawn.

Claims 18 and 29

Claims 18 and 29 were rejected under 35 USC § 103(a) as being unpatentable over Miller in view of U.S. Patent 5,813,753 (Vriens et al.). According to the Office Action, “it would have been obvious ... to provide the light source of Miller with a second multilayer reflector, as taught by Vriens, for reflecting visible light and transmitting excitation light.” Applicants respectfully submit that this rejection cannot be sustained.

The rejected claims depend directly or indirectly from amended claim 1, which now recites that the first non-planar multilayer reflector is “polymeric”. Neither Miller nor Vriens teach or suggest a polymeric multilayer reflector. Since neither applied reference teaches this particular limitation of the rejected claims, the rejection of claims 18 and 29 should be withdrawn.

Moreover, modifying Miller to include a second multilayer reflector as taught in Vriens would not occur to the person of ordinary skill because it would have no beneficial effect on the operation of Miller’s phosphor-based LEDs. Miller teaches that the light emitted by the LED die, after passing through the DBR mirror, “is then absorbed by the phosphorescent layer 36”. (Col. 6 lines 22-23.) Elsewhere, Miller teaches that the phosphorescent layer “operates to convert the primary light emitted from the GaN die 12 to secondary light through the process of phosphorescence.” (Col. 5 lines 65-67.) Nowhere does Miller indicate that any of the LED-emitted light passes beyond the phosphorescent layer 36. Therefore, adding a second multilayer reflector as taught in Vriens would serve no purpose nor have any beneficial effect on Miller’s phosphor-based LEDs. Withdrawal of the rejection of claims 18 and 29 is respectfully requested.

Claims 19-28

Claims 19-28 were rejected under 35 USC § 103(a) as being unpatentable over Miller and Vriens, in further view of Benson, Jr.

This rejection cannot be sustained at least because Benson, Jr. is non-analogous art, and is incompatible with at least Miller, for the reasons given above.

Claims 18 and 29-33

Claims 18 and 29-33 were rejected under 35 USC § 103(a) as being unpatentable over McNulty in view of Vriens.

The rejected claims depend directly or indirectly from amended claim 1, which now recites that the first non-planar multilayer reflector is “polymeric”. Neither McNulty nor Vriens teach or suggest a polymeric multilayer reflector. Since neither applied reference teaches this particular limitation of the rejected claims, the rejection of claims 18 and 29-33 should be withdrawn.

Moreover, the amendments to claims 29 and 30 make clear that the distinct “regions” of claims 30-33 each comprise phosphor particles dispersed in a binder. Such layer is not disclosed in either McNulty or Vriens. The rejection of claims 30-33 should thus be withdrawn for this additional reason.

Conclusion

In view of the foregoing, the application is submitted to be in condition for allowance, the early indication of which is earnestly solicited. Rejoinder of the withdrawn claims is also again requested.

Respectfully submitted,

19 Jan. 2007
Date

By: Stephen C. Jensen
Stephen C. Jensen, Reg. No.: 35,207
Telephone No.: 651-736-3369

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833